

National University Consortium Newsletter



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Questions or comments?

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Amy Lientz

Partnerships organization connects innovation of NUC universities with lab capabilities and staff

In eight years, a small modular nuclear reactor located on the Idaho National Laboratory Site could begin providing power to 44 municipal utilities in seven western states.

None of this is a done deal, including location. But enthusiasm for the project is strong and momentum building in part because of a design that will increase efficiency and safety while allowing for easy integration with renewable such as solar and wind.

Development of the original reactor concept occurred in 2000, the result of a collaborative project that involved Oregon State University, and the precursor to INL, Idaho National Engineering and Environmental Laboratory, and Nexant Industries. The original concept was refined by researchers at OSU and became the basis for the current NuScale Power Design.

This kind of government/industry/academia alliance is exactly what Battelle Energy Alliance had in mind when it created the National University Consortium in 2007 to advance nuclear energy research, demonstration and development, benefit the institutions and grow the lab's talent pipeline.

"Each of us brings our own unique capabilities," said Amy Lientz, director of INL's Partnerships group.

The NUC schools, The Ohio State University, North Carolina State University, Massachusetts Institute of Technology, University of New Mexico and Oregon State University, were originally chosen based on their geographic location and their capability in nuclear energy research.

As INL's clean energy and national security mission grew, INL engagement with each university expanded beyond the halls of the nuclear energy departments.

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The job of the Partnerships organization is to help connect the innovation of these universities with INL capabilities and researchers, through effective and strategic communication, proposal opportunities, technology deployment, internships, joint appointments and opportunities for post-doctoral students.

It is a collaboration that benefits everyone:

- The NUC universities receive a sustained, long-term relationship with the nation's top researchers, engineers and technicians.
- INL receives an infusion of energy and fresh ideas from university staff and students, while training a future workforce.
- Industry profits from knowledge gained and relationships created.
- And the country benefits as technological breakthroughs are made and the science, technology, engineering and mathematics (STEM) workforce gap narrows.

"The NUC relationship is key to a strong cross disciplinary, cross institutional approach," said NUC Deputy Director Marsha Bala. "We collaborate on projects to develop ideas for future INL missions, some of which may be five to 10 years in the making. Not all the expertise needed to tackle difficult research questions occurs in any one institution."

As INL has evolved so has the NUC. Since taking over INL on Oct. 1, Director Mark Peters has emphasized that the lab must focus on achieving operational excellence while building a reputation based on scientific achievement. Under the partnerships umbrella, Lientz sees a similar path forward for the NUC.

"In the end we want to achieve increased collaboration between the lab and our partner universities, resulting in more strategic opportunities to resolve the nation's big energy and security challenges," Lientz said.

Dr. Maria Avramova agrees. Director of the reactor dynamics and fuel modeling group at NCSU, Avramova said during a recent visit to INL that her students are definitely aware of the breadth and scope of the work done at the lab and are anxious to be a part of it.

"Young people want to go where the future is being built," she said.

NUC/INL Collaborations Recognized

The U.S. Department of Energy announced that five consolidated Innovative nuclear research (CINR) collaborations between Idaho National Laboratory and National University Consortium (NUC) schools will receive a combined \$805,000 in funding.

Here's a breakdown of the NUC/INL collaborations:

(1) NEUP R&D Award

Title: Alloying agents to Stabilize Lanthanides Against Fuel Cladding Chemical Interaction: Tellurium and Antimony Studies.

Project Lead: Jinsuo Zhang

University: The Ohio State University

INL Collaborator: Michael Benson, Robert Mariani, Yongfeng Zhang

Total Project Funding: \$800,000

Funding to INL: \$160,000

(2) NEUP R&D Award

Title: Microstructure Experiments-Enabled MARMOT Simulations of SiC/SiC-based Accident Tolerant Nuclear Fuel System

Project Lead: Jacob Eapen

University: North Carolina State University

INL Collaborator: Daniel Schwen

Total Project Funding: \$800,000

Funding to INL: \$75,000

(3) NEUP R&D Award

Title: Support for Reactor Operators in Case of Cyber-Security Threats

Project Lead: Carol Smidts

University: The Ohio State University

INL Collaborator: Timothy McJunkin

Total Project Funding: \$800,000

Funding to INL: \$50,000

(4) NEUP R&D Award

Title: Development and Application of a Data-Driven Methodology for Validation of Risk-Informed Safety Margin Characterization Models

Project Lead: Nam Dinh

University: North Carolina State University (also partnered with The Ohio State University)

INL Collaborator: Robert Youngblood

Total Project Funding: \$800,000

Funding to INL: \$360,000

(5) NEUP R&D Award

Title: Multi-group Transport Cross Section and Diffusion Coefficient Generation for Deterministic Reactor Models Using Monte Carlo Calculations

Project Lead: Kord Smith

University: Massachusetts Institute of Technology

INL Collaborator: Javier Ortensi

Total Project Funding: \$800,000

Funding to INL: \$160,000

Intern List

Of the roughly 350 interns at Idaho National Laboratory this summer, nearly 50 come from National University Consortium schools. Below is a list of NUC interns, their major, degree level and INL mentor.

Massachusetts Institute of Technology

<u>Name</u>	<u>Major</u>	<u>Mentor</u>	<u>Degree</u>
Alexandra Delmore	nuclear engineering	Sean Morrell	BS
Micah Gale	nuclear engineering	Phillip Erickson	BS
Jin Miaomiao	nuclear engineering	Cody Permann	PhD

North Carolina State University

Aly Ahmed	nuclear engineering	Richard Williamson	PhD
Bao, Han	nuclear engineering	Hongbin Zhang	PhD
Joseph Cambareri	nuclear engineering	Donna Guillen	BS
Pedram Ghassemi	nuclear engineering	Sebastian Schunert	PhD
William Harris	chemical engineering	Donna Guillen	BS
Nicholas Herring	nuclear engineering	Brenden Heidrich	BS
Linyu Lin	nuclear engineering	Steven Prescott	PhD
Zachary Morey	nuclear engineering	Phillip Erickson	BS
Alexander Pharr	nuclear engineering	Vivek Agarwal	BS
Jasrah Stephenson	statistics	Lawrence Hull	BS
Yangmo Zhu	nuclear engineering	Haihua Zhao	PhD

Ohio State University

Minghui Chen	nuclear engineering	James O'Brien	PhD
Doug Hardtmayer	welding engineering	Curtis Clark	BS
Michael Jindra	chemical engineering	Fred Stewart	BS
Claudia Picoco		Cristian Rabiti	
Michael Pietrykowski	nuclear engineering	Ahmad Al Rashdan	PhD

Oregon State University

Anthony Alberti	nuclear engineering	Javier Ortensi	PhD
Christian Buesch	materials science	Walter Williams	PhD
Ariana Foley	nuclear engineering	Sean Morrell	BS
Nick Gladfelter	computer science	Ryan Jackson	BS
Jackson Harter	nuclear engineering	Daniel Schwen	PhD
Thomas V. Holschuh	nuclear engineering	Sean Morrell	MS
Bjorn Westman	nuclear engineering	Brandon Miller	MS
Adam Zabriskie	nuclear engineering	Mark DeHart	PhD

University of New Mexico

Kyle Beling	nuclear engineering	David Nigg	BS
Alvara Gonzalez	nuclear engineering	Kemal Passmehmetoglu	BS
Katelyn Morales	communications	Lori Priest	BS
Nicholas Osterhaus	nuclear engineering	Jay Disser	BS
Japan Patel	nuclear engineering	Joshua Cogliati	PhD
Jonathan Paz	nuclear engineering	Virginia Wright	BS
Luis Quinones	nuclear engineering	Virginia Wright	BS
Matthew Ryals		Colby Jensen	
Elliot Sondheim	construction management	Al Lewis	BS
Paul W. Talbot	nuclear engineering	Cristian Rabiti	PhD
Brittany Umbrage	nuclear engineering	Vivek Agarwal	BS
David Weitzel	nuclear engineering	Congjian Wang	BS

Member Spotlight

Meet University of New Mexico Professor Dr. Anil K. Prinja Department of Nuclear Engineering



Dr. Anil K. Prinja, and the department he leads, is in a good place.

Prinja is chairman of the Department of Nuclear Engineering at the University of New Mexico (UNM). Prinja's school is one of five in the National University Consortium, a Battelle Energy Alliance-sponsored partnership that links Idaho National Laboratory with institutions of higher learning around the country. The other NUC partners are MIT, Oregon State, Ohio State and North Carolina State universities.

Prinja has been on the faculty at UNM since 1987 and has a long history of working with INL. It comes as no surprise then that Prinja was selected to serve on INL's Board of Managers. He attended his first meeting in March and said he walked away impressed with Director Mark Peters' vision and the lab's efforts to connect with local universities.

Talk to Prinja and you hear enthusiasm, about his department and the potential to grow its relationship with the nation's lead nuclear research, development and demonstration laboratory. Like many nuclear veterans, Prinja has experienced enough of the bad times to appreciate the space his industry occupies today.

Prinja earned his Ph.D. in nuclear engineering at the University of London, then crossed the ocean and spent eight years as a research faculty member at UCLA. This was the 1980s, however, and UCLA, like many universities, ended its nuclear engineering department, leaving Prinja searching for work in a field on the decline.

"Nuclear was in very bad shape at the time," he said. UNM had a nuclear engineering program dating back to the early 1960s. In 1972, it merged with the chemical engineering department and Prinja eventually joined that faculty. In 2014, chemical and nuclear went their separate ways, with Prinja selected to head up the newly minted UNM Department of Nuclear Engineering.

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Prinja has embraced the challenge of evolving his department from one constantly in survival mode to one that is growing and evolving.

The department began with seven people, but is expanding. Prinja said he is attempting to hire two new faculty members who would specialize in nuclear fuels, in part because that's an area of widespread interest but also because of the potential for greater collaboration with INL.

"We hope to have a significant overlap with INL with the new hires," Prinja said.

In truth, that's already happening. Prinja said three UNM faculty and two students are currently involved in INL projects that are funded under the LDRD program. Also, the school is preparing for its inaugural joint appointment with the lab. INL and UNM have been, as Prinja said, "joined at the hip" since BEA took over management of the lab in 2004.

Dr. Edward Blandford and his graduate students collaborate with INL research staff to perform an experimental investigation on boiling heat transfer and pressure drop characteristics of key accident tolerate fuel clad concepts. Dr. Adam Hecht has an INL-funded project to investigate live time and integrated neutron effects on crystals via optical characterization to enable neutron dosimetry in harsh environments. The intent is to enable live-time dosimetry using crystals within the TREAT reactor.

"It's a very strong and powerful arrangement," Prinja said. "It's proven very beneficial to us and I want to grow it as much as I can."

INL also has a bigger vision with its NUC partners. UNM, for example, has exceptional capabilities in cyber security and modeling and simulation.

"My recent visit left me with the vivid impression that UNM is thoughtfully expanding their program with INL specifically in mind," said Marsha Bala, INL's NUC program director. "New faculty in nuclear fuels and materials, the possibility of an industrial control and cybersecurity master's and/or summer school, and successful research collaborations indicate a pivotal expression of partnership."

Thoughts on the April Board of Managers Meeting

by Dr. Anil K. Prinja

My first Board of Managers meeting, as member of the Science and Technology Committee and representing the National University Consortium provided me a unique vantage point to learn about Idaho National Laboratory's vision under the new leadership.

I was very impressed by the leadership team's roadmap for achieving excellence in the science and technology programs, organized around four principal initiatives: the Gateway for Accelerated Innovation in Nuclear (GAIN) initiative, small modular reactors (SMRs), national security and clean energy.

The guiding principle that emerged from the presentations and discussions was the creation of centers of innovation to underpin INL's efforts to become an undisputed leader in an evolving nuclear landscape.

As the NUC representative on the board, I was especially pleased to learn about the lab's desire to be proactive in engaging with universities in their research and educational missions with a forward-thinking spirit.

Plans were described to expand and facilitate opportunities for university faculty-INL staff interactions and collaborations through the LDRD program and the newly instituted Joint Appointment program that will promote exchange visits of variable duration by both university faculty and INL staff.

The possibility of INL staff spending sabbaticals at universities to help update, modernize and even deliver curricula that is relevant to the lab and industry, such as interdisciplinary programs in cyber-security, is a unique and win-win idea.

Also laudable are the lab's aggressive recruitment efforts to establish a healthy talent pipeline by strengthening internship programs for graduate and undergraduate students that can lead to post-graduation appointments in postdoctoral and staff positions.

You can't go wrong with a mission that makes INL an attractive place for young professionals who believe nuclear energy is important for global energy and economic security.

In The News

- June 13: The National University Consortium (NUC) held its quarterly meeting in New Orleans. Discussion focused on topics to be featured in the breakout sessions during the annual meeting at Idaho National Laboratory in August.
- All interested parties are encouraged to submit possible topics. As a reference, a list of nuclear-related topics recently funded by Department of Energy was distributed during the meeting.
- June 21-22: Idaho National Laboratory Director Mark Peters and Kelly Beierschmitt, the lab's director for science and technology and chief resource officer, conducting the first NUC university visit June 21-22 at MIT.
- Peters and Beierschmitt also recently spent a day and a half meeting with MIT faculty and leadership to discuss the future INL-MIT collaborations.
- Former INL Lab Director John Grossenbacher recently received an honorary degree from the University of Idaho. Honorary degrees are awarded to a person deserving of honor by virtue of scholarly distinction, noteworthy public service, or significant contributions to the state of Idaho. "It was an honor to be recognized by the University of Idaho with an honorary Ph.D. An honor such as this is very significant and reflects not only the accomplishments of INL over the past 10 years but is also an expression of the importance and value of the lab to Idaho," Grossenbacher said.

TREAT news: Several notable events have taken place recently at the Transient Reactor Test (TREAT) facility. the list includes:

- Completed poison assembly validation of the hold-down margin of the TREAT core. This activity successfully verified that the core remained highly subcritical even with all control and transient rods removed. This is a significant milestone in support of the mock operations phase allowing qualification of Reactor Operators, as well as, reactor operational procedure validation.
- Completed the milestone, "Complete Automatic Reactor Control System (ARCS) Software Verification and Validation." Based on successful completion of the test cases. ARCS initial baseline software verification and validation is complete and ARCS software is ready to support.
- Completed the milestone, "Complete Manual Reactor Control System (MRCS) Functional Testing," on April 5, 2016 ahead of the due date. To accomplish this milestone, several low-voltage power supplies were replaced; several panel meters.
- Poison Assembly Validation in MFC-724 Room were repaired; and control/shutdown, compensation, and transient rods were exercised from the control room through their full range of motion; and a series of component checks and calibrations were performed to verify the functionality of MRCS components.
- Completed manual calibrations of the Reactor Trip System (RTS) and initiated Dedicated Microprocessor Testing (DMT). The DMT tests all nuclear instruments and set points of the RTS. These activities support completion of RTS functional testing expected to be completed the first week of May.

EBR II



Thirty years ago, a decorated group of INL scientists showed the world that a nuclear reactor could safely cool down by itself in the event of an electrical blackout. In April, many of those who worked on the Environmental Breeder Reactor II gathered at the Materials and Fuels Complex to remember and celebrate their accomplishment.